Stat and Data Analysis Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chi-Square test for Association

1. The manager of an assembly process wants to determine whether the number of defective articles manufactured depends on the day of the week the articles are produced. Using the data below from an SRS taken each day of the week, is there sufficient evidence to determine if the number of defective articles is independent of the day of the week?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Day** | **Mon** | **Tue** | **Wed** | **Thur** | **Fri** |
| Nondef. | 85 | 90 | 95 | 95 | 90 |
| Defective | 15 | 10 | 5 | 5 | 10 |

Expected Cell Counts:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Day** | **Mon** | **Tue** | **Wed** | **Thur** | **Fri** |
| Nondef. |  |  |  |  |  |
| Defective |  |  |  |  |  |

1. The following table is from the July 1993 publication of *Vital and Health Statistics* from the Centers for Disease Control and Prevention/National Center for Health Statistics. The individuals in the following table have only one of the three indicated irritations. Determine if the type of irritation is independent of the age group using a 0.05 level of significance. Sample was from a SRS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Irritation** | **18-29** | **30-44** | **45-64** | **65+** |
| Eye | 440 | 567 | 349 | 59 |
| Nose | 924 | 1311 | 794 | 102 |
| Throat | 253 | 311 | 157 | 19 |

Expected cell counts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Irritation** | **18-29** | **30-44** | **45-64** | **65+** |
| Eye |  |  |  |  |
| Nose |  |  |  |  |
| Throat |  |  |  |  |

1. The following table shows the number of reported crimes committed last year in the inner part of a large city. The crimes were classified according to type of crime and district of the inner city where it occurred. Do these data show sufficient evidence to reject the hypothesis that the type of crime and the district in which it occurred are independent? Use α=0.01.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| District | **Robbery** | **Assault** | **Burglary** | **Larceny** | **Stolen Vehicle** |
| 1 | 54 | 331 | 227 | 1090 | 41 |
| 2 | 42 | 274 | 220 | 488 | 71 |
| 3 | 50 | 306 | 206 | 422 | 83 |
| 4 | 48 | 184 | 148 | 480 | 42 |
| 5 | 31 | 102 | 94 | 596 | 56 |
| 6 | 10 | 53 | 92 | 236 | 45 |

Expected Cell counts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| District | **Robbery** | **Assault** | **Burglary** | **Larceny** | **Stolen Vehicle** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
| 3 |  |  |  |  |  |
| 4 |  |  |  |  |  |
| 5 |  |  |  |  |  |
| 6 |  |  |  |  |  |

4. Many colleges survey graduating classes to determine the plans of the graduates. We might wonder whether the plans of students are the same at different colleges. Here’s a two-way table for Class of 2006 graduates from several colleges at one university. Each cell of the table shows how many students from a particular college made a certain choice. Is there an association between choice of post-graduation activity and college major?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Agriculture** | **Arts & Sciences** | **Engineering** | **Social Science** |
| **Employed** | 379 | 305 | 243 | 125 |
| **Grad School** | 186 | 238 | 202 | 96 |
| **Other** | 104 | 123 | 37 | 58 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Agriculture** | **Arts & Sciences** | **Engineering** | **Social Science** |
| **Employed** |  |  |  |  |
| **Grad School** |  |  |  |  |
| **Other** |  |  |  |  |